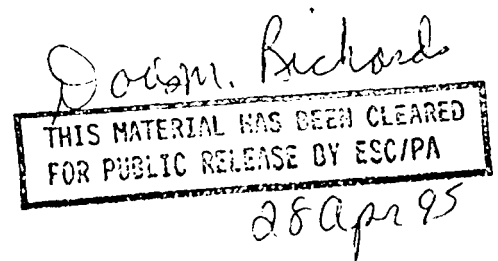


Numerical simulations on the effects of
positive ion **beam** emissions
from negatively charged spacecraft

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ABSTRACT

Spacecraft tend to charge negatively in space plasmas at night. Positive ions ejected from a negatively charged spacecraft can escape provided that the ions are sufficiently energetic. Most ion beams devices to date generate high energy beam ions mixed with a low energy neutral gas. Charge exchange between the ions and the neutrals generate low energy ions which are attracted back to the spacecraft. In this presentation, ion beam emission effects on a negatively and differentially charged spacecraft are studied by means of numerical simulations. Electrostatic particle-in-cell with Monte Carlo collision simulation codes are developed for studying the time development of the effects of the charge exchange. Not only the low energy ions return to the spacecraft but they tend to return to the "hot" spots. The return of ions reduces the level of differential charging gradually. If the returning ions can generate secondary electrons, the level of negative spacecraft charging is also reduced.

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